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(54) **Apparatus for manipulating a quantity of radioactive material between a stored position and a use position.**

(57) Apparatus for manipulating a quantity of radioactive material including a capsule of said radioactive material comprising a storage unit (2) with a radioactively shielded through passage in which the capsule is stored, manipulating means (20) remotely located from the storage unit, first flexible conduit means (6A) connectible to the storage unit between one end of the passage and the manipulating means and flexible elongated drive means movable in the conduit means and the passage for moving the capsule between the stored position and the use position, there being provided reel means (20) on which the manipulating means are mounted and which afford a form (22,23) for coiling the conduit means thereon and second conduit means (6B) permanently coiled on the reel means for housing a supply of the drive means.

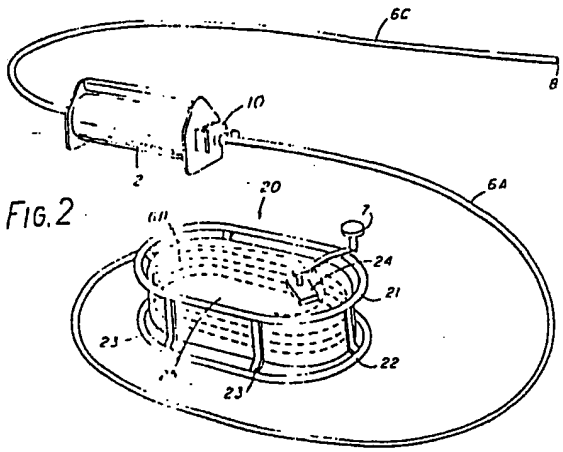


FIG. 2

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# Apparatus for manipulating a quantity of radioactive material between a stored position and a use position

## THE PRIOR ART

As is shown in Figure 1 of the accompanying drawings, systems for the handling of radioactive material 1 involve the provision of a storage unit 2 having a mass 3 of radiotion-shielding material with a passage 4 through it, in which the radioactive material can be safely stored when not in use, as is shown in Fig. 1 at A, and from which the radioactive material can be moved to a use location, as for making a radiograph, as is shown in Figure 1 at C. Typically, the radioactive material 1 is connected to drive means comprising a flexible cable 5 in a guide tube 6. The guide tube is generally provided in three essentially equal-lengths 6A, 6B and 6C, each of which can be disconnectibly coupled to the storage unit 2. Under control of a reel and crank arrangement 7 the drive cable 5 pushes the radioactive material out of the passage 4 and through the third guide tube 6C to a snout 8 located where the radiograph is to be made, as shown in Fig. 1 at B and C. The portion of drive cable 5 in the second guide tube 6B supplies the cable necessary to fill the first and third guide tubes 6A and 6C when a radiograph is being made. A disconnectible coupler 9 is fitted in the drive cable 5 so that when the radioactive material 1 is in the stored position the drive cable can be parted outside the storage unit for uncoupling the cable 5 and the guide tubes 6A and 6B from the storage unit. The part of drive cable 5 between the coupler 9 and the radioactive material 1 is known as the leader 11, and the coupling apparatus 10 between the guide tubes 6A and 6B and the storage unit 2 generally contains means to lock the leader against movement through the passage 4 when the drive means are uncoupled and removed. Patents Nos. 3,147,333 and 3,593,594 describe prior systems in which these features are found. As is seen in these patents, two lengths of guide tube 6A and 6B

are typically furnished for guiding and protecting the cable 5 and, in use, both lengths of guide tube are laid out between the reel-and-crank arrangement 7 and the storage unit 2.

## GENERAL NATURE OF THE INVENTION

The present invention provides improved control apparatus, in which only one guide tube, equivalent to guide tube 6A, is required to be laid out between the reel-and-crank arrangement 7 and the storage unit 2, the extra supply of cable 5 being housed in a second guide tube, equivalent to guide tube 6B, of relatively lighter weight that is permanently coiled at the same location as the reel-and-crank arrangement. This reduces the weight and the cost of systems for handling radiographic material, and simplifies the tasks of setting up and taking down the systems.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a known system, described above, to which the invention is applicable.

FIG. 2 is a three-dimensional view of a system incorporating a reel-and-crank assembly according to the invention;

FIG. 3 is a top plan view of the reel-and-crank assembly;

FIG. 4 is a side view of figure 3, partly broken away;

FIG. 5 is an end view of figure 3 partly broken away; and

FIG. 6 illustrates a variety of coil-shapes that can be used in practicing the invention.

## DETAILED DESCRIPTION OF THE DRAWINGS

In Figures 2 to 5, inclusive, a reel 20 of a known

configuration has two oval-shaped rails 21, 22 fixed to spanner bars 23 between them on the exterior of which the coupler guide tube 6A can be coiled when the system is not in use. As shown, this guide tube is uncoiled and laid out between the reel 20 and a storage unit 2, to which it is disconnectibly coupled at one end by a coupler 10. The coupler 10 is one that is suitable for coupling a single guide tube and the drive cable 5 (not shown) within it to the storage unit, and a suitable couple is described and claimed in the copending application of the same inventors executed concurrently with this application, Serial No._____, filed _____. The exposure guide tube 6C leading to the snout 8 is also laid out, so that the system, as illustrated in figure 2, is prepared for use to make a radiograph. The third or storage guide tube section 6B is permanently coiled under a platform 25, within the spanner bars 23, as illustrated in dashed line. The crank 7 and a direction selector ratchet 24 are shown on the platform 25. The ratchet has a direction change lever 26 which enables the crank to be latched in either of its extreme positions -- i.e., radiographic material source 1 fully out into the snout 8, or radiographic material source 1 fully retracted into the storage unit 2. The platform 25 covers a shell-like housing 27 fitted within the spanner bars 23 and closed at the bottom (in figures 4 and 5) with a second cover 28. The storage tube 6B is permanently coiled against the inner wall of the housing 27, and retained in place by several clamps 30 which are each affixed at one end to the bottom cover 28 and the other end to the housing 27. The coupler tube 6A passes from a reel 35 within the housing 27 out through a hole 38 in the housing wall. The storage tube 30 remains at all times inside the housing 27. The reel 35 may be of any suitable kind known to the art; the coupler

tube 6A and storage tube 6B are each connected at one end to it, so that a drive cable 5 (not shown in figures 2-5) can be moved from one tube to the other during operation as is shown in Figure 1. A revolution counter 39, with indicia 42 visible through a window 44 in the top cover 25, but otherwise of known form, is also provided.

The permanently-coiled storage tube 6B can take any convenient configuration. One consideration in choosing a configuration is the torque in inch-pounds that will be required to force the flexible cable 5 around the curves of the permanently-coiled storage tube. Figure 6 illustrates several possible configurations, at A, B, C, D and E, respectively. Assuming that the storage tube 6B is made of "Teflon" (trademark for a tetrafluoroethylene polymer), inside diameter 0.250 inch., wall thickness 0.030 inch, and that for reference it requires 10 inch-pounds of torque at the crank 7 to force the flexible cable through two (2) straight sections of this tube each 25 feet long (i.e.: one section being equivalent to tube 6B and the other being equivalent to tube 6A) the torque characteristics of each illustrated shape are as follows:

A -- Circle
16 inch diameter -- 12 inch-pounds
14 inch diameter -- 15 inch-pounds
12 inch diameter -- 25 inch-pounds

B -- Spiral -- inside diameter of coil = 9 inches, and 7 1/2 turns of coil -- 25 inch-pounds

C -- Square -- with corners curved on 4 1/2 inch radius -- 20 inch-pounds

D -- Oval -- two ends semi-cricular on 4 1/2 inch radii, and intervening straight lengths "9" -- 25 inch-pounds

E -- Triangle-equilateral -- with corners curved on 4 1/2 inch radii and straight sections "9" between corners -- 25 inch pounds.

The oval configuration shown in Figure 6 at D is

essentially the configuration that is illustrated in figures 2-5, inclusive, that being the configuration which is closest to the shape of reels that have heretofore been used in the art for storing cables and both tubes 6A, 6B on the outside. In the present invention the housing 27 supports and protects the comparatively frail storage tube 30 at its outer periphery, especially at the curved-linear portions where the drive-cable 5 can exert force on it tending to straighten the curve.

CLAIMS:

1. In radiographic apparatus for manipulating a quantity of radioactive material between a stored position and a use position including a capsule of said radioactive material, a storage unit with a passage through it for storing the capsule in the passage and shielding the surrounding environment from the stored radioactive material, manipulating means for location remote from said storage unit, first flexible conduit means connectible to said storage unit between one end of said passage and the manipulating means, and flexible elongated drive means movable within said conduit means and said passage for moving said capsule between a stored position and a use position under control of said manipulating means, the improvement comprising: reel means mounting said manipulating means and providing a form for coiling said conduit means externally around said reel means, and second conduit means permanently coiled on said reel means for housing a supply of said drive means.

2. Apparatus according to claim 1 wherein said second conduit means is coiled within said form.

3. Apparatus according to claim 1 wherein said second conduit means is permanently coiled in a shape including straight-linear and curved-linear portions.

4. Apparatus according to claim 3 including means for supporting said second conduit means at the outer peripheries of said curved linear portions.

5. Apparatus according to claim 1 wherein said second conduit means is a tube made of a flexible material characterized by low sliding friction to drive means housed therein.

6. Apparatus according to claim 1 wherein said first conduit means is a tube reinforced to resist crushing and external abrasion and said second conduit means is a substantially lighter-weight tube devoid of such reinforcing means.

7. Apparatus according to claim 1 including disconnectible coupler means comprised of a first component fixed to said storage unit at said one end of said passage and a second component of tubular shape fixed at one end to an end of said flexible conduit means remote from said manipulating means, said first component having a tubular aperture for receiving said second component endwise therein, and means for releasably locking said second component to said first component.

8. Apparatus according to claim 1 including a support affixed to said form and mounting said manipulating means, said form including wall means providing a housing, said second conduit means being fixed to said wall means within said housing.

9. Apparatus according to claim 8 including closure means for said housing, said manipulating means including a portion within said housing communicating with both of said conduit means, and a hand crank portion outside of said housing.

10. Apparatus according to claim 9 wherein said first-named conduit means extends through said wall means for communicating with said manipulating means inside said housing.

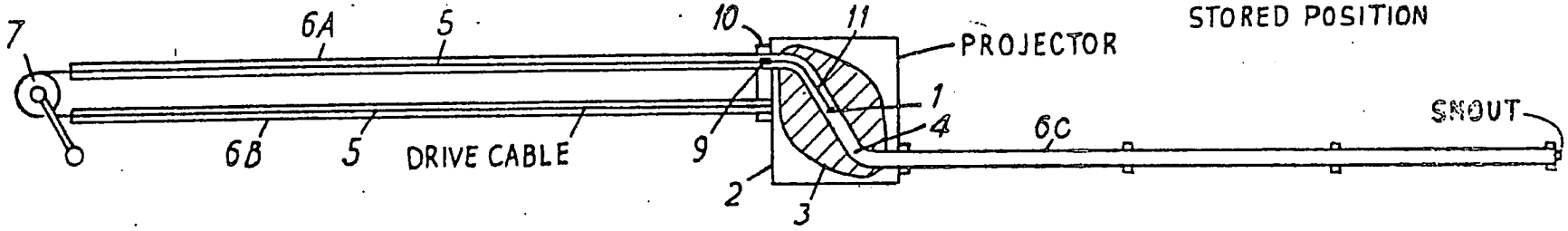


FIG. 1A PRIOR ART
STORED POSITION

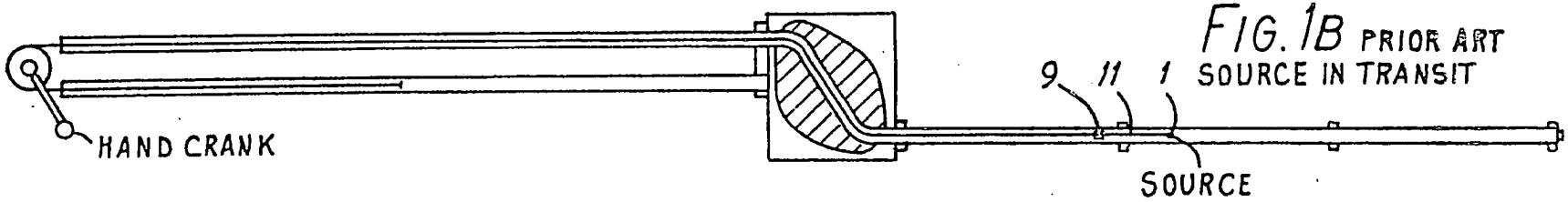


FIG. 1B PRIOR ART

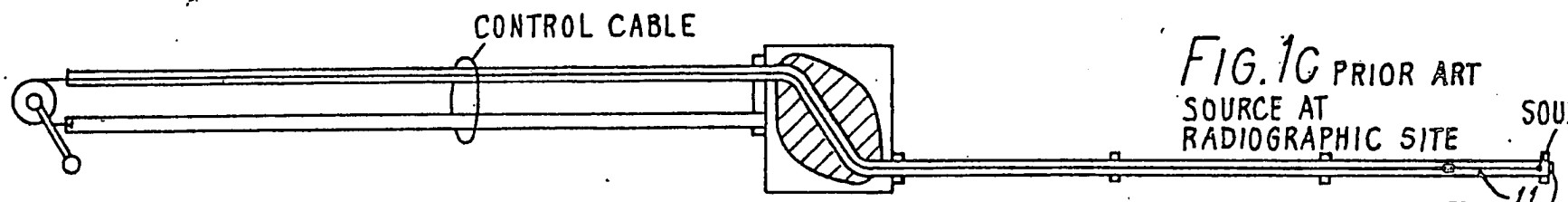


FIG. 1C PRIOR ART
SOURCE AT
RADIOGRAPHIC SITE

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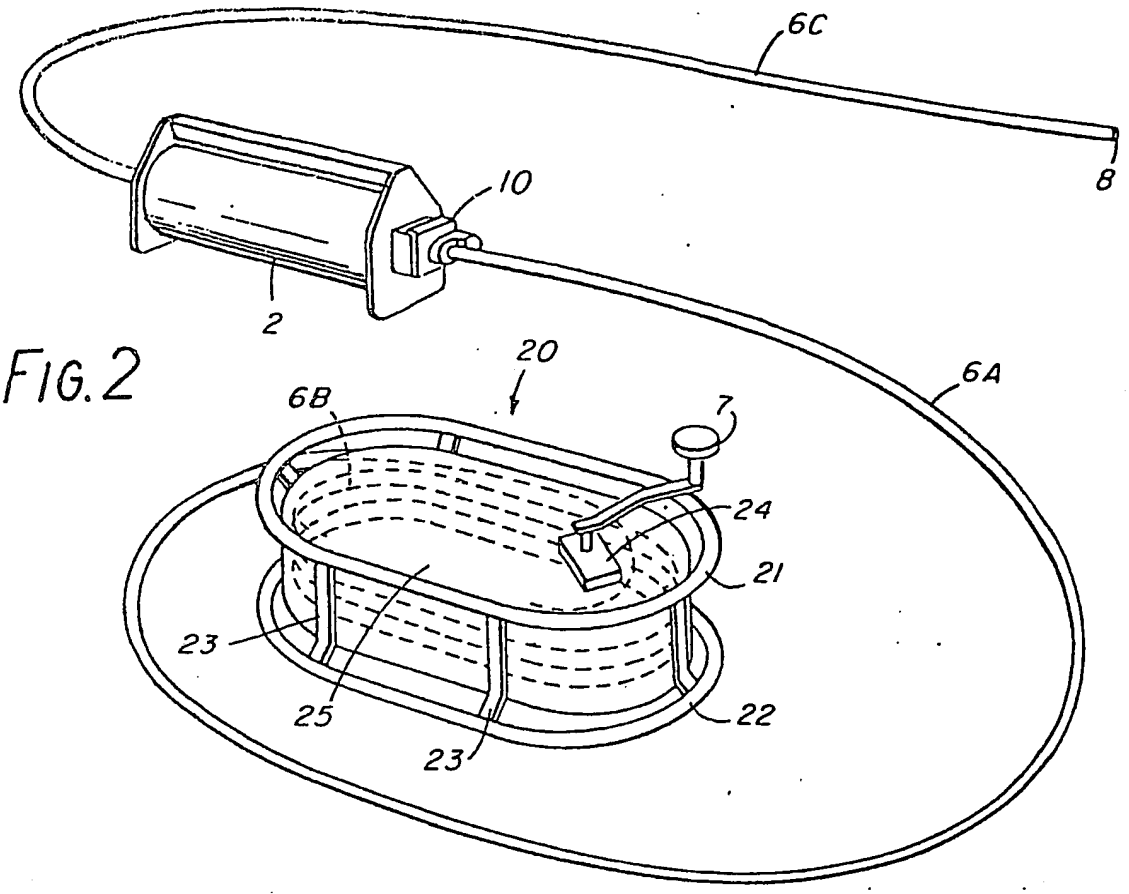


FIG. 2

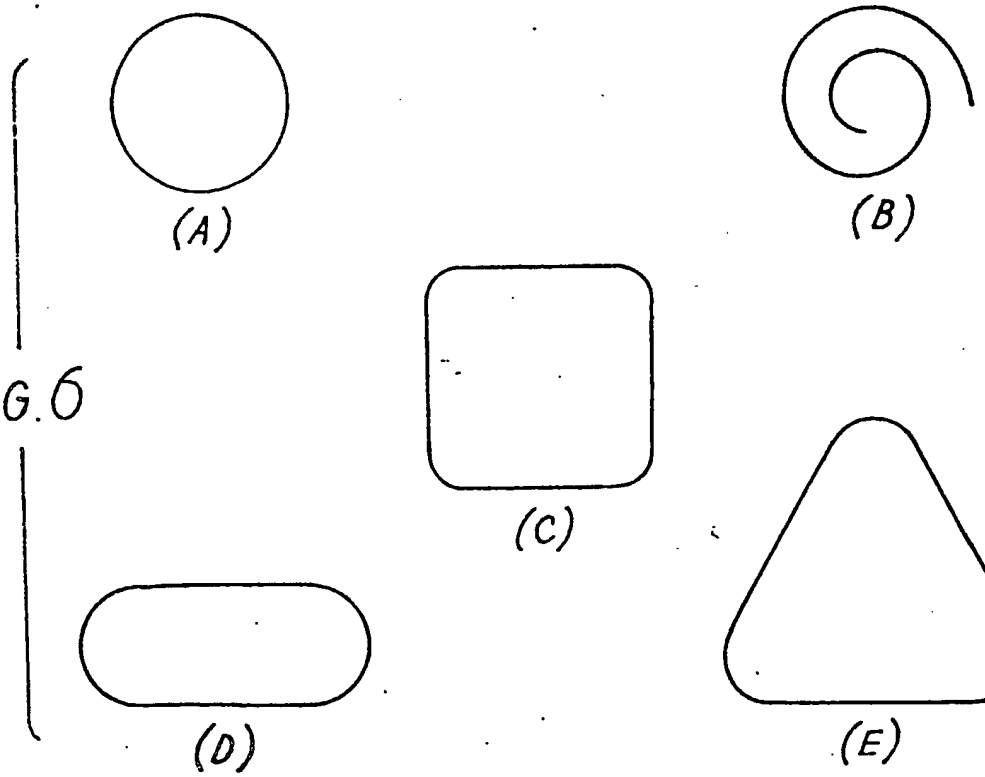


FIG. 6

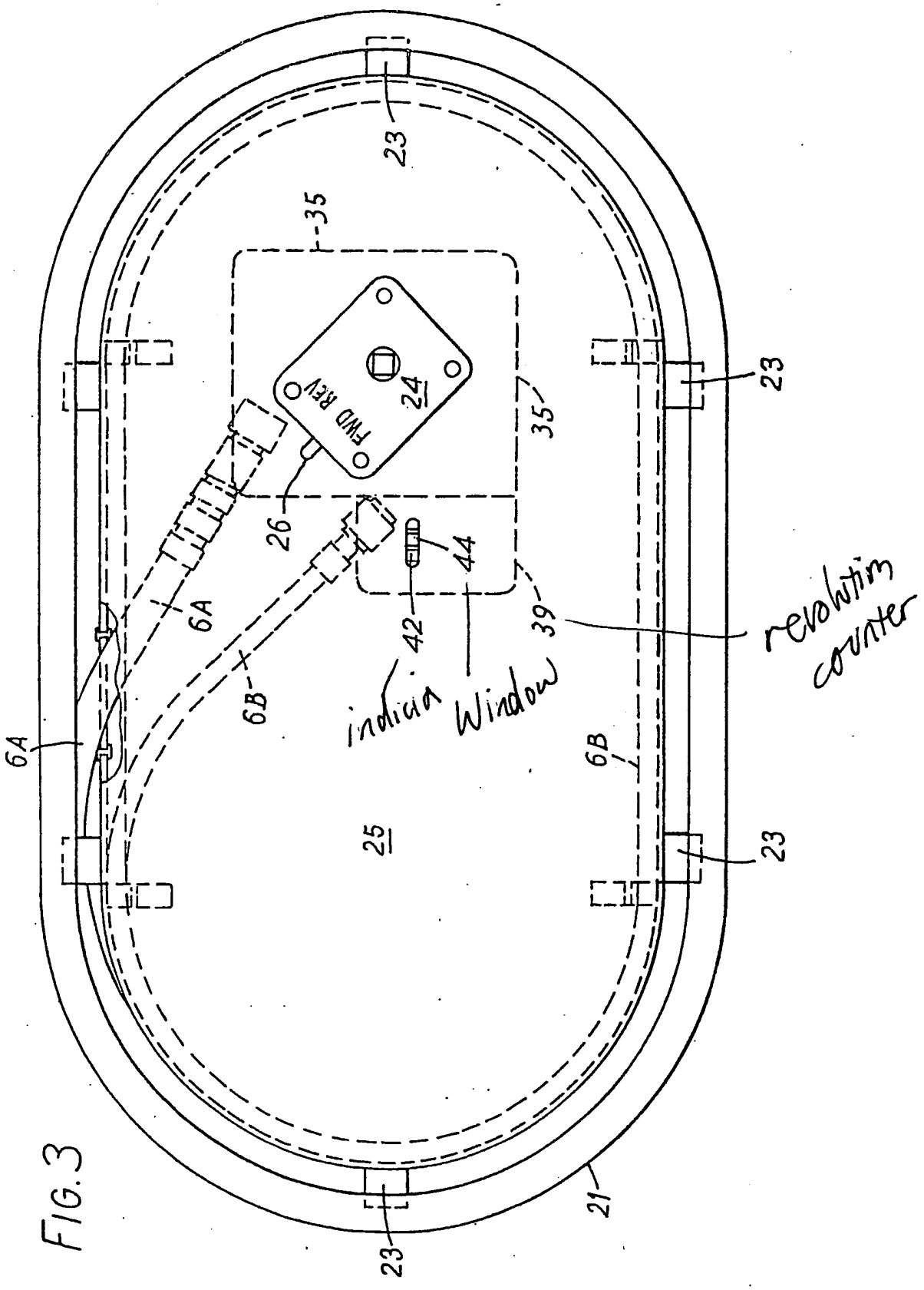
23
I-35
FWD REV
24
35
23
26
44
6A
42
39
revolution counter
6B
indicia Window
6A
6B
25
23
21
23

FIG. 3

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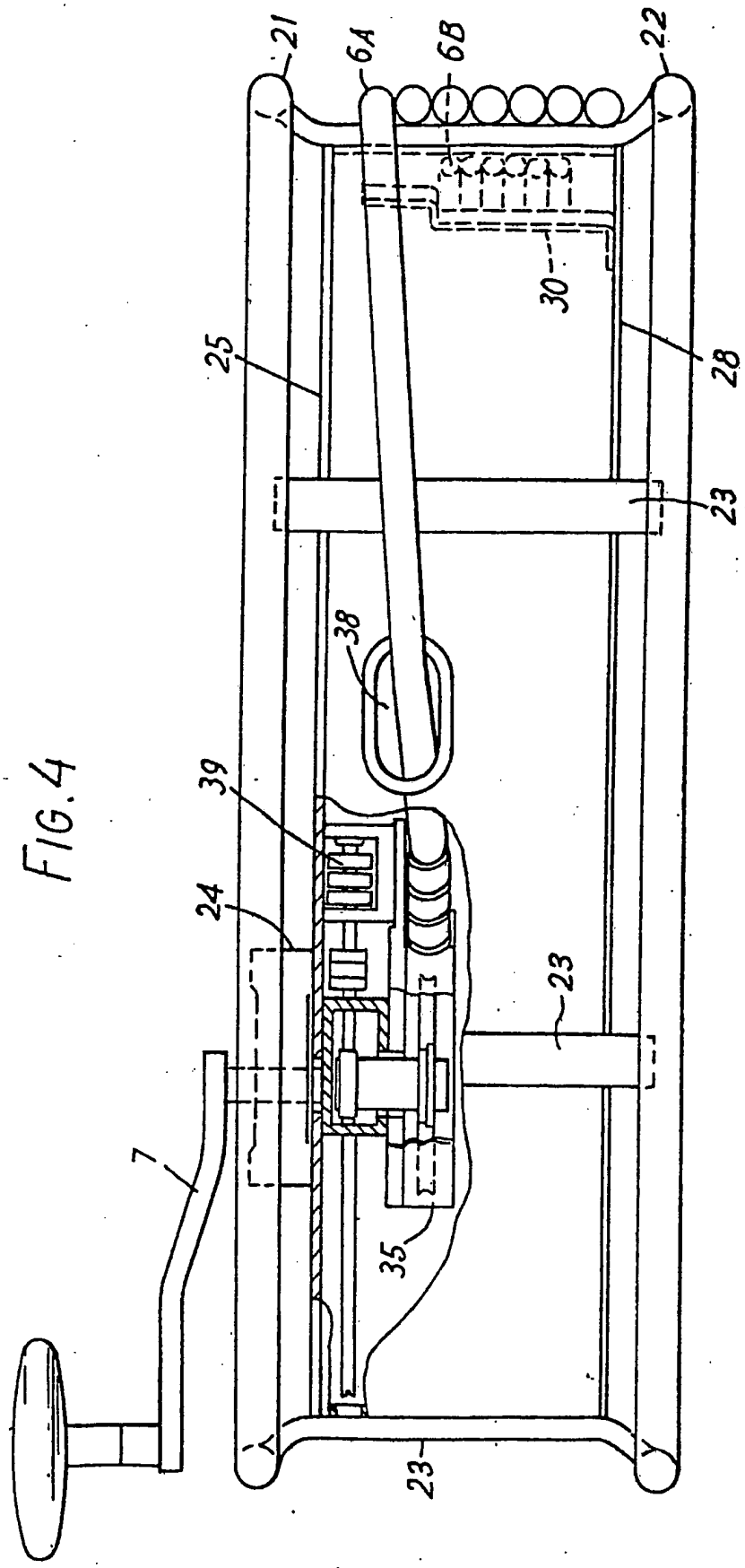
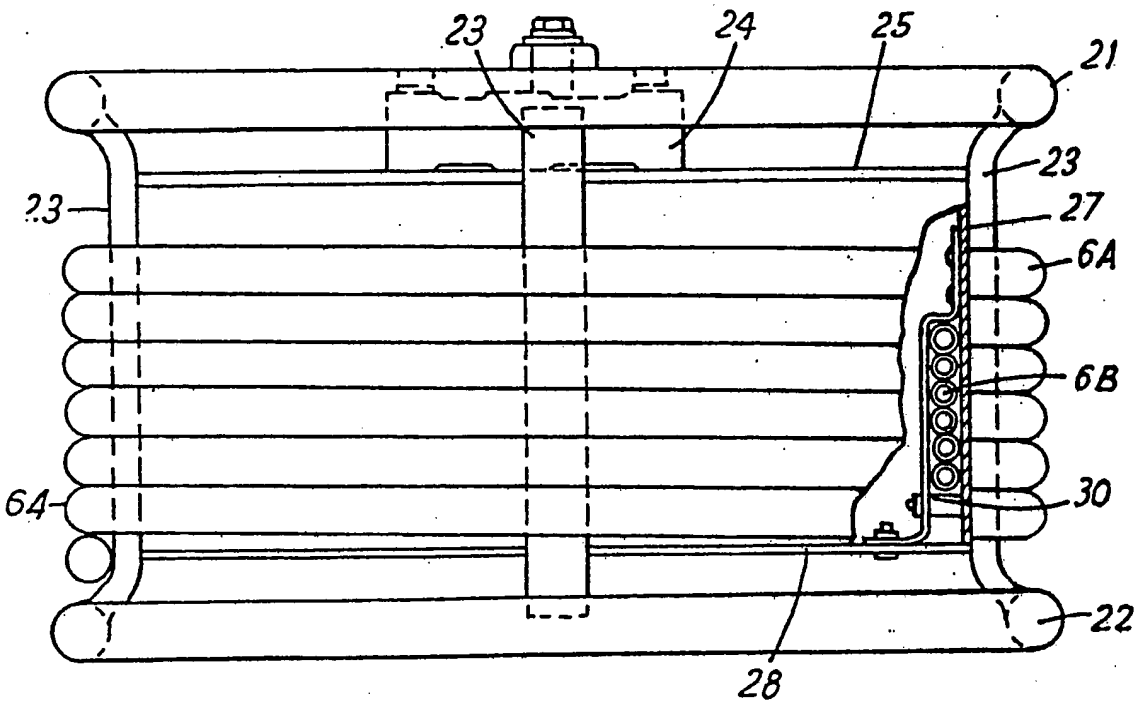



FIG.4

FIG. 5



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# EUROPEAN SEARCH REPORT

Application number: 0012004

EP 79 30 2695

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim |
|---|---|---|
| | US - A - 3 861 380 (D. CHASSAGNE et al.)<br>* Abstract; column 1, line 61 - column 2, line 30; column 3, line 22 - column 4, line 38; figures 1-3 * | 1-3,5, 7 |
| | DE - C - 961 200 (SIEMENS-REINIGERWERKE AKTIENGESELLSCHAFT)<br>* Page 1, lines 1-10; page 2, line 69 - page 3, line 11; page 3, lines 40-43; figures 10,11 * | 1-3 |
| | FR - A - 1 586 696 (COMMISSARIAT A L'ENERGIE ATOMIQUE)<br>* Page 1, lines 1-5; page 2, lines 19-27; page 3, lines 6-30; figures 2,6,11 * | 1-3,5-7,9 |
| | GB - A - 712 009 (S. STEIN)<br>* Page 1, lines 8-23; page 2, lines 56-101; figures 1,3 * | 1,9 |
| | US - A - 3 669 093 (K. SAUERWEIN et al.)<br>* Abstract; column 3, lines 7-58; column 3, line 72 - column 4, line 22; figures 1-3 * | 1-8 |
| A | US - A - 2 862 108 (J. MEILINK)<br>* Column 1, line 38 - column 2, line 18; figures 1,2 * | 1-3 |

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

G 21 F 7/00
5/02
A 61 N 5/10

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

G 21 F 7/00
5/02
G 21 K 5/08
A 61 N 5/10

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

[X] The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 10-03-1980 | VILLEMIN |

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(54) **Apparatus for manipulating a quantity of radioactive material between a stored position and a use position.**

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(56) References cited:
**DE-C- 961 200**
**FR-A-1 586 696**
**GB-A- 712 009**
**US-A-2 862 108**
**US-A-3 669 093**
**US-A-3 861 380**

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Courier Press, Leamington Spa, England.

## Description

The prior art

As is shown in Figures 1A, B, C of the accompanying drawings, systems for the handling of radioactive material 1 involve the provision of a storage unit 2 having a mass 3 of radiation-shielding material with a passage 4 through it, in which the radioactive material can be safely stored when not in use, as is shown in Fig. 1A, and from which the radioactive material can be moved to a use position, as for making a radiograph, as is shown in Figure 1C. Typically, the radioactive material 1 is connected to drive means comprising a flexible cable 5 in guide tubes 6A, B, C. The guide tubes are generally provided in three essentially equal-lengths 6A, 6B and 6C, each of which can be disconnectibly coupled to the storage unit 2. Under control of a reel and crank arrangement 7 the drive cable 5 pushes the radioactive material out of the passage 4 and through the third guide tube 6C to a snout 8 located where the radiograph is to be made, as shown in Fig. 1B and C. The portion of drive cable 5 in the second guide tube 6B supplies the cable necessary to fill the first and third guide tubes 6A and 6C when a radiograph is being made. A disconnectible coupler 9 is fitted in the drive cable 5 so that when the radioactive material 1 is in the stored position the drive cable can be parted outside the storage unit for uncoupling the cable 5 and the guide tubes 6A and 6B from the storage unit. The part of drive cable 5 between the coupler 9 and the radioactive material 1 is known as the leader 11, and the coupling apparatus 10 between the guide tubes 6A and 6B and the storage unit 2 generally contains means to lock the leader against movement through the passage 4 when the drive means are uncoupled and removed. US Patent 3,593,594 describes prior systems in which these features are found. As is seen in these patents, two lengths of guide tube 6A and 6B are typically furnished for guiding and protecting the cable 5 and, in use, both lengths of guide tube are laid out between the reel-and-crank arrangement 7 and the storage unit 2.

General nature of the invention

The present invention provides improved control apparatus, in which only one guide tube, equivalent to guide tube 6A, is required to be laid out between the reel-and-crank arrangement 7 and the storage unit 2, the extra supply of cable 5 being housed in a second guide tube, equivalent to guide tube 6B, of relatively lighter weight that is permanently coiled at the same location as the reel-and-crank arrangement. This reduces the weight and the cost of systems for handling radiographic material, and simplifies the tasks of setting up and taking down the systems.

Brief description of the drawings

Fig. 1 illustrates a known system, described above, to which the invention is applicable.

Fig. 2 is a three-dimensional view of a system incorporating a reel-and-crank assembly according to the invention;

Fig. 3 is a top plan view of the reel-and-crank assembly;

Fig. 4 is a side view of figure 3, partly broken away;

Fig. 5 is an end view of figure 3 partly broken away; and

Fig. 6 illustrates a variety of coil-shapes that can be used in practicing the invention.

Detailed description of the drawings

In Figures 2 to 5, inclusive, a reel 20 of a known configuration has two oval-shaped rails 21, 22 fixed to spanner bars 23 between them on the exterior of which the first or coupler guide tube 6A can be coiled when the system is not in use. As shown, this guide tube is uncoiled and laid out between the reel 20 and a storage unit 2, to which it is disconnectibly coupled at one end by a coupler 10. The coupler 10 is one that is suitable for coupling a single guide tube and the drive cable (not shown) within it to the storage unit. The third or exposure guide tube 6C leading to the snout 8 is also laid out, so that the system, as illustrated in figure 2, is prepared for use to make a radiograph. The second or storage guide tube 6B is permanently coiled under a platform 25, within the spanner bars 23, as illustrated in dashed line. The crank 7 and a direction selector ratchet 24 are shown on the platform 25. The ratchet has a direction change lever 26 which enables the crank to be latched in either of its extreme positions—i.e., radiographic material source 1 fully out into the snout 8, or radiographic material source 1 fully retracted into the storage unit 2. The platform 25 covers a shell-like housing 27 fitted within the spanner bars 23 and closed at the bottom (in figures 4 and 5) with a second cover 28. The storage tube 6B is permanently coiled against the inner wall of the housing 27, and retained in place by several clamps 30 which are each affixed at one end to the bottom cover 28 and the other end to the housing 27. The coupler tube 6A passes from a reel 35 within the housing 27 out through a hole 38 in the housing wall. The storage tube 30 remains at all times inside the housing 27. The reel 35 may be of any suitable kind known to the art; the coupler tube 6A and storage tube 6B are each connected at one end to it, so that a drive cable 5 (not shown in figures 2—5) can be moved from one tube to the other during operation as is shown in Figure 1. A revolution counter 39, with indicia 42 visible through a window 44 in the top cover 25, but otherwise of known form, is also provided.

The permanently-coiled storage tube 6B can take any convenient configuration. One consideration in choosing a configuration is the

torque in Nm (Newtonmeter) that will be required to force the flexible cable 5 around the curves of the permanently-coiled storage tube. Figure 6 illustrates several possible configurations, at A, B, C, D and E, respectively. Assuming that the storage tube 6B is made of "Teflon" (trademark for a tetrafluoroethylene polymer), inside diameter 0,00635 m (0.250 inch), wall thickness about 0,00076 m (0.030 inch), and that for reference it requires about 1,1 Nm (10 lb/in) of torque at the crank 7 to force the flexible cable through two (2) straight sections of this tube each about 7,5 m (25 feet) long (i.e.: one section being equivalent to tube 6B and the other being equivalent to tube 6A) the torque characteristics of each illustrated shape are as follows:

A—Circle
About 0,406 m (16 inch diameter)—about 1,32 Nm (12 lb/in).
About 0,356 m (14 inch diameter)—about 1,65 Nm (15 lb/in).
About 0.305 (12 inch diameter)—about 2,75 Nm (25 lb/in).

B—Spiral
Inside diameter of coil=about 0,23 m (9 inches), and 7 1/2 turns of coil—about 2,75 Nm (25 lb/in).

C—Square
With corners curved on about 0,114 m (4 1/2 inch) radius—about 2,2 Nm (20 lb/in).

D—Oval
Two ends semi-circular on about 0,114 m (4 1/2 inch) radii, and intervening straight lengths "9"—about 2,75 Nm (25 lb/in).

E—Triangle-equilateral
With corners curved on about 0,114 m (4 1/2 inch) radii and straight sections between corners—about 2,75 Nm (25 lb/in).

The oval configuration shown in Figure 6 at D is essentially the configuration that is illustrated in figures 2—5, inclusive, that being the configuration which is closest to the shape of reels that have heretofore been used in the art for storing cables and both tubes 6A, 6B on the outside. In the present invention the housing 27 supports and protects the comparatively frail storage tube 30 at its outer periphery, especially at the curved-linear portions where the drive-cable 5 can exert force on it tending to straighten the curve.

**Claims**

1. In radiographic apparatus for manipulating a quantity of radioactive material between a stored position and a use position including a capsule of said radioactive material, a storage unit (2) with a passage (4) through it for storing the capsule in the passage and shielding the surrounding environment from the stored radioactive material, manipulating means (7, 24, 26) separately housed from the storage unit to enable location thereof remotely from said storage unit, a first flexible guide tube (6A) connectible to said storage unit between one end of said passage and the manipulating means, a second guide tube (6B) connected at one end thereof to the manipulating means, a third guide tube (6C) connectible to said storage unit (2) and leading to the use position, and flexible elongated drive means (5) movable under control of the manipulating means along the interior of said first, second and third guide tubes and said passage to effect movement of said capsule between a stored position and a use position, characterised in that, reel means (20) are provided on which said manipulating means are mounted and which provide a form (25, 27, 28) for releasably coiling said first guide tube (6A) externally thereon and for mounting said second guide tube (6B) in coiled form permanently thereon.

2. Apparatus according to Claim 1, characterised in that said second guide tube (6B) is coiled within said form (25, 27, 28).

3. Apparatus according to Claim 1, characterised in that said second guide tube is permanently coiled in a shape including straight-linear and curved-linear portions.

4. Apparatus according to Claim 3, characterised by means for supporting said second guide tube at the outer peripheries of said curved linear portions.

5. Apparatus according to Claim 1, characterised in that said second guide tube is a tube made of a flexible material having low sliding friction to drive means housed therein.

6. Apparatus according to Claim 1, characterised in that said first guide tube is a tube reinforced to resist crushing and external abrasion and said second guide tube is a substantially lighter-weight tube devoid of such reinforcing means.

7. Apparatus according to Claim 1 including a support affixed to said form and mounting said manipulating means, said form including wall means (27) providing a housing, said second guide tube being fixed to said wall means within said housing.

8. Apparatus according to Claim 7 including closure means for said housing, said manipulating means including a reel (35) within said housing being connected with both of said first and second guide tubes, and a hand crank portion (7) outside of said housing.

9. Apparatus according to Claim 8, characterised in that said first guide tube extends through said wall means for communicating with said manipulating means inside said housing.

**Patentansprüche**

1. Vorrichtung zum Manipulieren einer

Menge radioaktiven Materials zwischen einer Aufbewahrungsstellung und einer Gebrauchsstellung in einer radiografischen Vorrichtung mit einer das radioaktive Material enthaltenden Kapsel, einer von einem Durchlaß (4) durchsetzten Aufbewahrungseinheit (2) für die Aufbewahrung der Kapsel in dem Durchlaß und Abschirmen der Umgebung von dem aufbewahrten radioaktiven Material, einer Manipuliereinrichtung (7, 24, 26), welche getrennt von der Aufbewahrungseinheit untergebracht ist, so daß sie entfernt von der Aufbewahrungseinheit angeordnet werden kann, einem zwischen einem Ende des Durchlasses und der Manipuliereinrichtung mit der Aufbewahrungseinheit verbindbaren ersten flexiblen Führungsrohr (6A), einem an einem Ende mit der Manipuliereinrichtung verbundenen zweiten Führungsrohr (6B), einem mit der Aufbewahrungseinheit (2) verbindbaren und zur Gebrauchsstellung führenden dritten Führungsrohr (6C) und einer flexiblen, langgestreckten Antriebseinrichtung (5), welche unter Steuerung durch die Manipuliereinrichtung entlang dem Innenraum des ersten des zweiten und des dritten Führungsrohrs sowie dem Durchlaß bewegbar ist, um die Bewegung der Kapsel zwischen einer Aufbewahrungsstellung und einer Gebrauchsstellung zu bewirken, dadurch gekennzeichnet, daß eine Aufwickeleinrichtung (20) vorgesehen ist, auf welcher die Manipuliereinrichtung montiert ist und welche eine Form (25, 27, 28) aufweist, auf deren Außenseite das erste Führungsrohr (6A) abnehmbar aufwickelbar ist und auf welcher das zweite Führungsrohr (6B) in aufgerollter Form dauernd gehalter ist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das zweite Führungsrohr (6B) innerhalb der Form (25, 27, 28) aufgewickelt ist.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das zweite Führungsrohr dauerhaft zu einer Gestalt aufgewickelt ist, welche geradlinige und gekrümmt verlaufende Abschnitte aufweist.

4. Vorrichtung nach Anspruch 3, gekennzeichnet durch Einrichtungen zum Stützen des zweiten Führungsrohrs an den äußeren Umfangsbereichen der gekrümmt verlaufenden Abschnitte.

5. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das zweite Führungsrohr aus einem flexiblen Material gefertigt ist, welches eine niedrige Gleitreibung relativ zu der darin untergebrachten Antriebseinrichtung aufweist.

6. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das erste Führungsrohr verstärkt ist, um einem Zusammenquetschen und äußerem Abrieb zu widerstehen, und daß das zweite Führungsrohr ein beträchtlich leichtgewichtigeres Rohr ohne derartige Verstärkungseinrichtungen ist.

7. Vorrichtung nach Anspruch 1, mit einer an der Form befestigten und die Manipuliereinrichtung tragenden Halterung, wobei die Form eine ein Gehäuse bildende Wandungsanordnung (27) aufweist und das zweite Führungsrohr innerhalb des Gehäuses an der Wandungsanordnung befestigt ist.

8. Vorrichtung nach Anspruch 7 mit einer Verschlußeinrichtung für das Gehäuse, wobei die Manipuliereinrichtung eine innerhalb des Gehäuses angeordnete und mit dem ersten sowie mit dem zweiten Führungsrohr verbundene Haspel (35) und eine außerhalb des Gehäuses angeordnete Kurbel (7) aufweist.

9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß sich das erste Führungsrohr durch die Wandungsanordnung hindurch erstreckt und innerhalb des Gehäuses mit der Manipuliereinrichtung verbunden ist.

**Revendications**

1. Appareil radiographique pour manipuler une certaine quantité de matériau radio-actif entre une position de stockage et une position d'utilisation, comprenant une capsule dudit matériau radio-actif, une unité de stockage (2) traversée par un passage (4) pour stocker la capsule dans le passage et masquer le matériau radio-actif stocké par rapport au milieu environnant, des moyens de manipulation (7, 4, 26) logés séparément par rapport à l'unité de stockage pour permettre de les placer à l'écart de ladite unité de stockage (2), un premier tube de guidage flexible (6A) susceptible d'être relié à ladite unité de stockage entre l'une des extrémités dudit passage et les moyens de manipulation, un deuxième tube de guidage (6B) relié par l'une de ses extrémités aux moyens de manipulation, un troisième tube de guidage (6C) susceptible d'être relié à ladite unité de stockage (2) et aboutissant à la position d'utilisation et des moyens d'entraînement allongés flexibles (5) mobiles sous la commande des moyens de manipulation à l'intérieur et le long desdits premier, deuxième et troisième tubes de guidage et dudit passage pour effectuer le mouvement de ladite capsule entre une position de stockage et une position d'utilisation, caractérisé en ce qu'il est prévu des moyens à touret (20) sur lesquels sont montés lesdits moyens de manipulation et qui fournissent un gabarit (26, 27, 28) pour enrouler extérieurement sur celui-ci de façon amovible ledit premier tube de guidage (6A) et pour monter ledit deuxième tube de guidage (6B) sur celui-ci de façon permanente sous forme bobinée.

2. Appareil selon la revendication 1, caractérisé en ce que ledit deuxième tube de guidage (6B) est bobiné à l'intérieur dudit gabarit (25, 27, 28).

3. Appareil selon la revendication 1, caractérisé en ce que ledit deuxième tube de guidage est bobiné de façon permanente sous une forme comprenant des parties en ligne droite et des parties en ligne courbe.

4. Appareil selon la revendication 3, caractérisé par des moyens pour supporter ledit deuxième tube de guidage aux périphéries extérieures desdites parties en ligne courbe.

5. Appareil selon la revendication 1, caractérisé en ce que ledit deuxième tube de guidage est un tube fait d'une matière souple ayant un faible frottement au glissement pour des moyens d'entraînement logés dans ce tube.

6. Appareil selon la revendication 1, caractérisé en ce que ledit premier tube de guidage est un tube armé pour résister à l'écrasement et à l'abrasion extérieure et ledit deuxième tube de guidage est un tube nettement plus léger, dépourvu de tels moyens d'armature.

7. Appareil selon la revendication 1, comprenant un support fixé audit gabarit et servant au montage desdits moyens de manipulation, ledit gabarit comprenant des moyens formant paroi (27) qui établissent un logement, ledit deuxième tube de guidage étant fixé auxdits moyens formant paroi à l'intérieur dudit logement.

8. Appareil selon la revendication 7, comprenant des moyens de fermeture pour ledit logement, lesdits moyens de manipulation comprenant, à l'intérieur dudit logement, un touret (35) relié à la fois auxdits premier et deuxième tubes de guidage et, à l'extérieur dudit logement, une partie formant manivelle (7).

9. Appareil selon la revendication 8, caractérisé en ce que leidt premier tube de guidage traverse lesdits moyens formant paroi, pour communiquer avec lesdits moyens de manipulation à l'intérieur dudit logement.

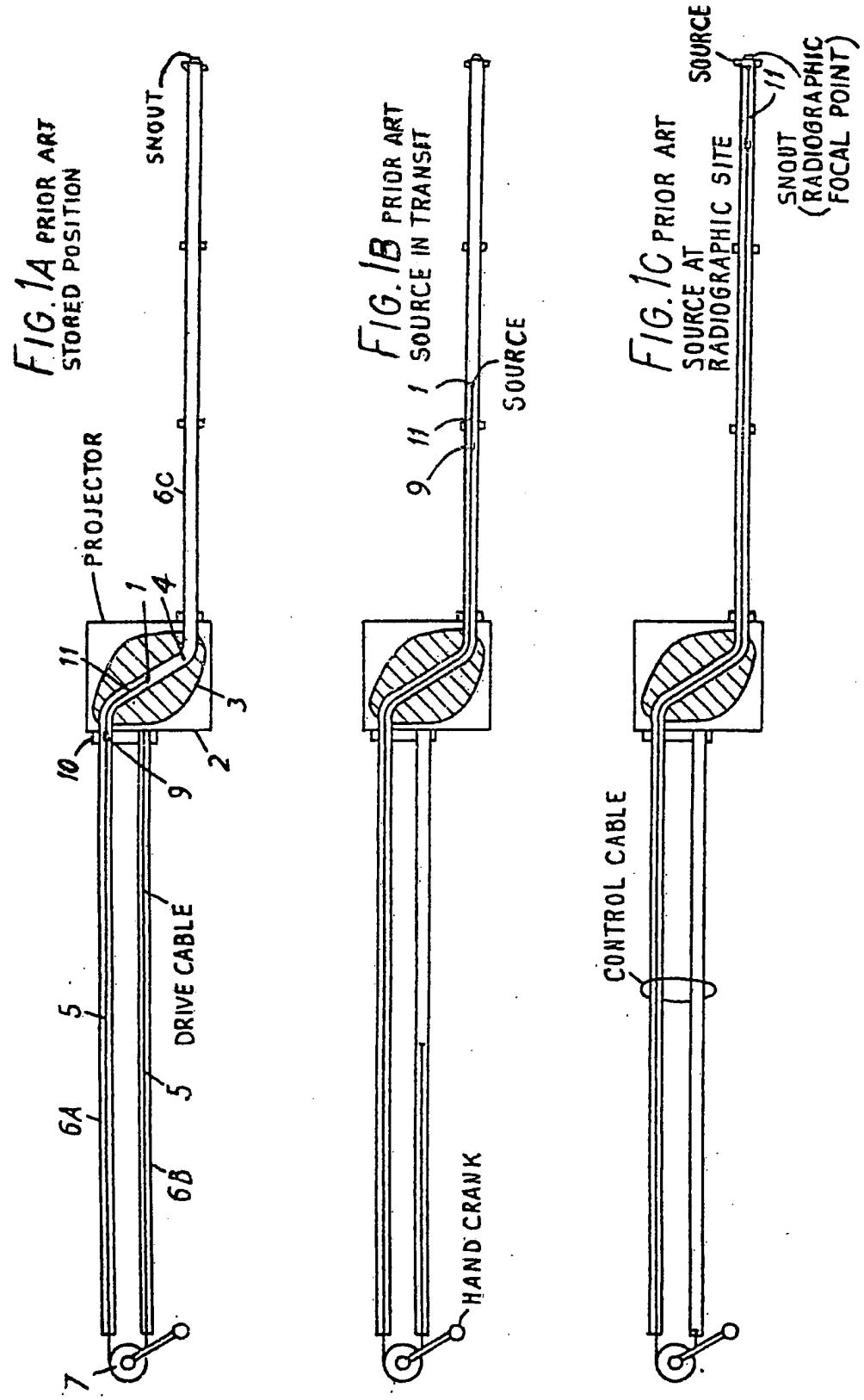
FIG. 1A PRIOR ART
STORED POSITION
SNOUT
PROJECTOR
6C
1
4
11
3
10
2
9
DRIVE CABLE
5
6A
5
6B
7
FIG. 1B PRIOR ART
SOURCE IN TRANSIT
1
11
9
SOURCE
HAND CRANK
FIG. 1C PRIOR ART
SOURCE AT
RADIOGRAPHIC SITE
SOURCE
11
SNOUT
(RADIOGRAPHIC
FOCAL POINT)
CONTROL CABLE

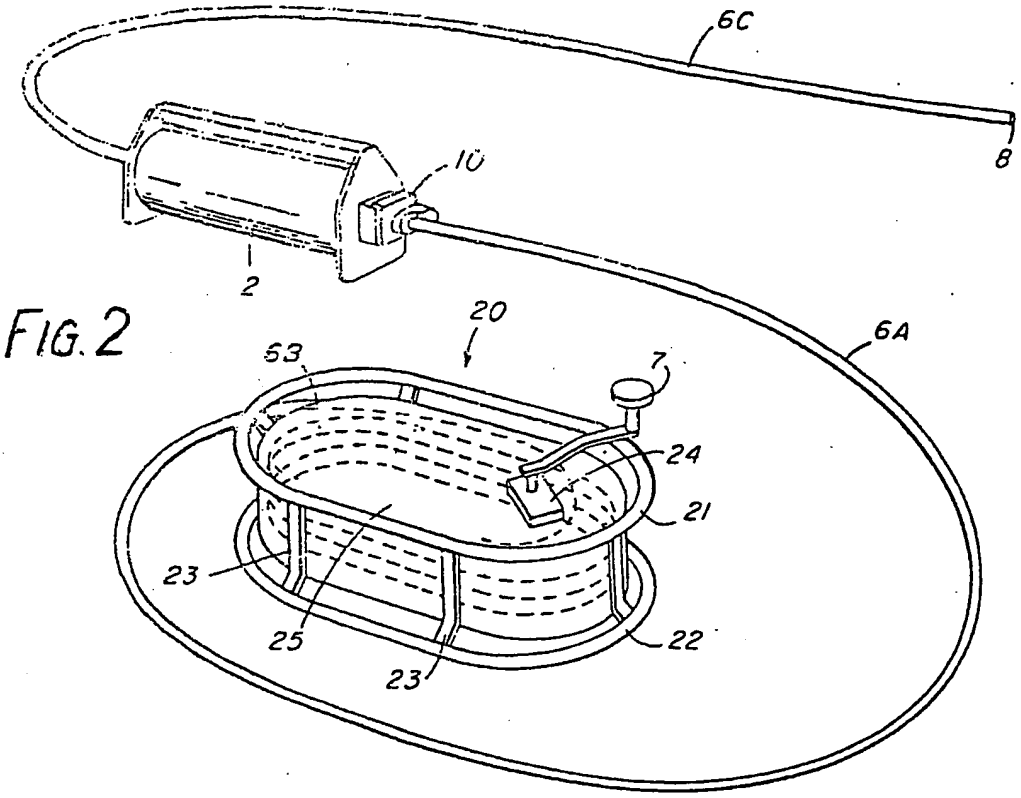


FIG. 2

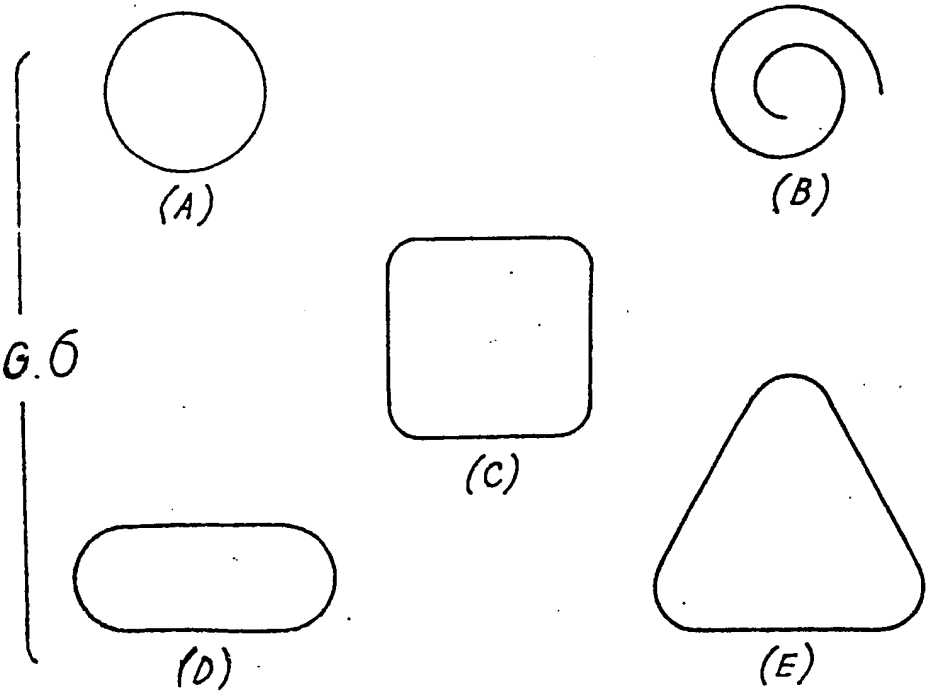


FIG. 6

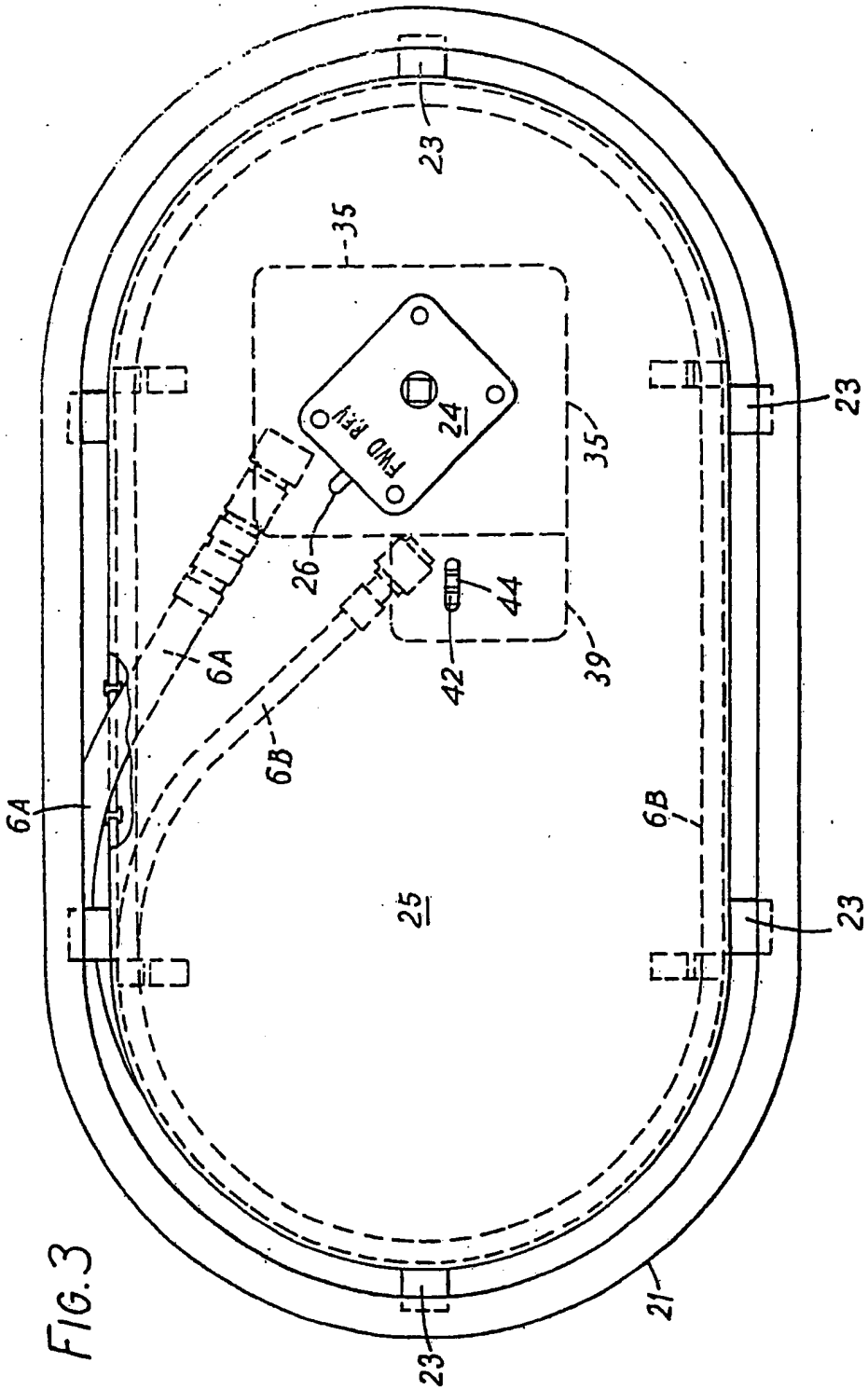


FIG. 3

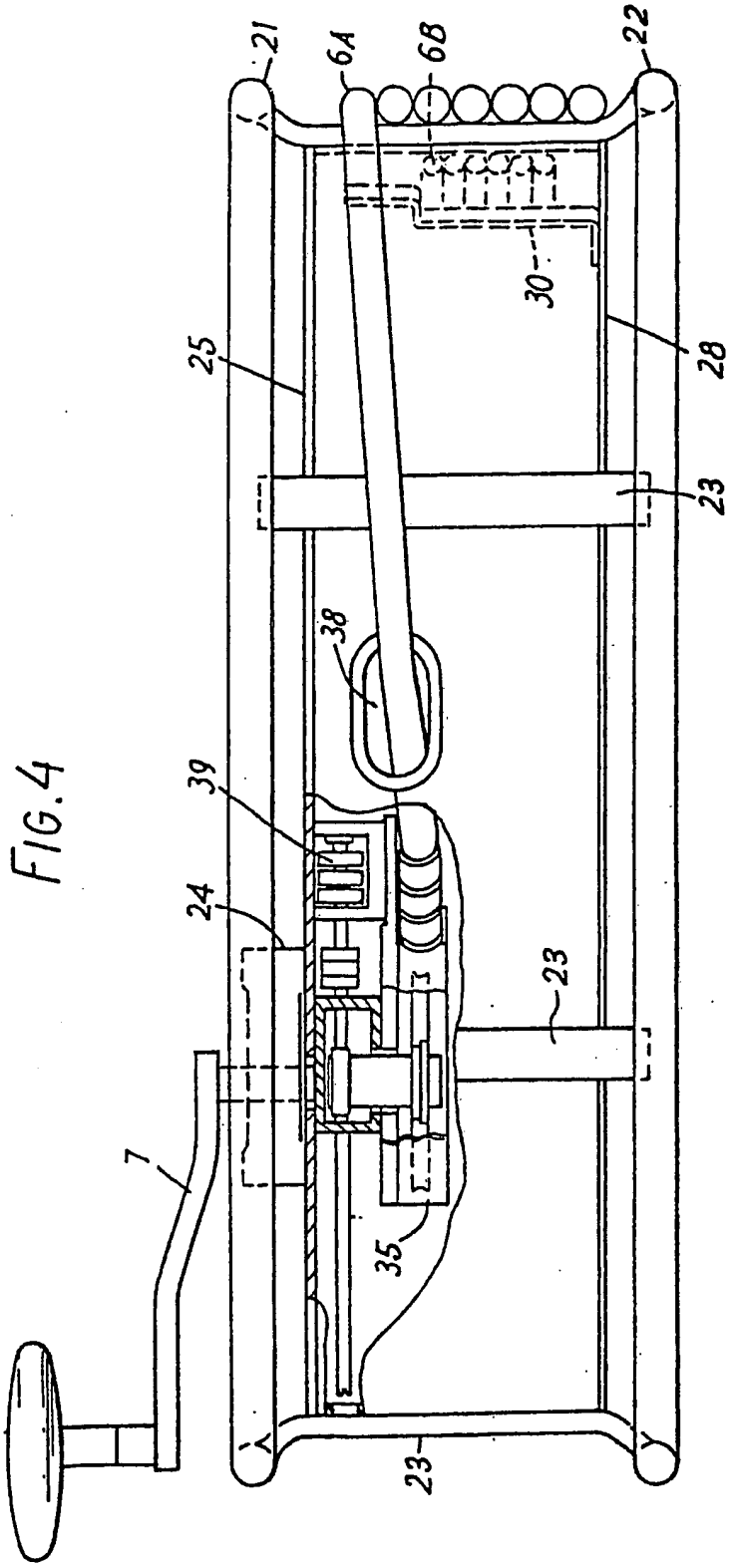


FIG.4

FIG. 5